

The opinion in support of the decision being entered today  
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* DANIEL J. BRATEK, PHILIP KANG, ROBERT C. KOSBERG, and  
JAMES L. NOWICKI

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Appeal 2007-1548  
Application 10/702,346  
Technology Center 3700

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Decided: August 23, 2007

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Before TERRY J. OWENS, JENNIFER D. BAHR, and LINDA E. HORNER,  
*Administrative Patent Judges.*

HORNER, *Administrative Patent Judge.*

DECISION ON APPEAL

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### STATEMENT OF THE CASE

The Appellants seek our review under 35 U.S.C. § 134 of the rejection of claims 1-12. Claims 13-16 have been withdrawn from consideration. We have jurisdiction under 35 U.S.C. § 6(b) (2002).

### SUMMARY OF DECISION

We AFFIRM.

### THE INVENTION

The Appellants' claimed invention is to a high pressure sensor assembly, such as for use in an automotive environment (Specification 1:5, 2:13-14). Claim 1, reproduced below, is representative of the subject matter on appeal.

1. A method of assembling a high pressure sensor with a knurl press-fit for use in an automotive environment, the method comprising the steps of:

providing a pressure port having a material with a first hardness and a housing having a material with a second hardness less than the first hardness, the pressure port having a mounting boss and the housing having a receptacle for receiving the mounting boss;

configuring the mounting boss of the pressure port with knurls thereon, the knurls oriented parallel to an axis of the pressure port; and

pressing the mounting boss of the pressure port into the receptacle of the housing along a direction of the axis such that the knurls deform the receptacle of the housing to conform about the knurls to define a semi-rigid mount.

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## THE REJECTION

The Examiner relies upon the following as evidence of unpatentability:

Ito	US 5,158,390	Oct. 27, 1992
Pepperling	US 6,715,360 B1	Apr. 6, 2004

The Appellants seek our review of the rejection of claims 1-12 under 35 U.S.C. § 103(a) as unpatentable over Pepperling and Ito.

## ISSUE

The issue before us is whether the Appellants have shown that the Examiner erred in determining that the subject matter of claims 1-12 would have been obvious in view of the teachings of Pepperling and Ito. The issue focuses on whether one having ordinary skill in the art would have had a reason to apply the knurled, press-fit jointing structure of Ito to the pressure sensor assembly of Pepperling.

## FINDINGS OF FACT

We find that the following enumerated findings are supported by at least a preponderance of the evidence. *Ethicon, Inc. v. Quigg*, 849 F.2d 1422, 1427, 7 USPQ2d 1152, 1156 (Fed. Cir. 1988) (explaining the general evidentiary standard for proceedings before the Office).

1. Pepperling discloses a gauge pressure sensor assembly 72 including a pressure port 74 (referred to as a housing) and a mounting boss 78 (referred to as an attachment portion) (Pepperling, col. 3, ll. 59-65).

2. Pepperling teaches affixing the sensor assembly 72 to an explosion proof housing 90 using a press-fit between the mounting boss 78 and the housing 90, which may, if desired, include a crimp, stab-in, or other mechanical deformation of the housing 90 and/or the pressure port 74 (Pepperling, col. 4, ll. 18-22).
3. Pepperling's pressure port 74 is made of a material inherently having a first hardness.
4. Pepperling does not disclose providing a housing having a material having a second hardness less than the first hardness; configuring the mounting boss of the pressure port with knurls thereon, the knurls oriented parallel to an axis of the pressure port; or pressing the mounting boss of the pressure port into the receptacle of the housing along a direction of the axis such that the knurls deform the receptacle of the housing to conform about the knurls to define a semi-rigid mount.
5. Ito discloses a jointing structure of a rotor and a shaft, in which the rotor and shaft can be firmly jointed (Ito, col. 1, ll. 12-16).
6. In Ito's jointing structure, the rotor is made of aluminum alloy and the shaft is made of steel (Ito, col. 2, ll. 8-9). As such, the rotor is made of a material of a hardness less than the hardness of the shaft material.
7. Ito describes that the rotor 1 has a through-hole 2 at its center and the shaft 3 has a series of humps 4 and valleys 5 on at least a part of a jointing surface, the outer diameter of the hump portion 4 being larger than the inner diameter of the through-hole 2, such that when the hump portion 4 and

valley portion 5 of the shaft 3 are press-fit into the through-hole 2 of the rotor 1, the inner peripheral surface of the through-hole 2 is deformed in a depressed shape along the series of humps 4 and valleys 5 of the shaft 3 to intimately mesh the rotor and shaft to create a firm jointing of the two (Ito, col. 3, ll. 23-46).

#### PRINCIPLES OF LAW

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1734, 82 USPQ2d 1385, 1391 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations.

*Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). See also *KSR*, 127 S.Ct. at 1734, 82 USPQ2d at 1391 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”)

In *KSR*, the Supreme Court emphasized “the need for caution in granting a patent based on the combination of elements found in the prior art,” *id.* at 1739, 82 USPQ2d at 1395, and discussed circumstances in which a patent might be

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determined to be obvious. In particular, the Supreme Court emphasized that “the principles laid down in *Graham* reaffirmed the ‘functional approach’ of *Hotchkiss*, 11 How. 248.” *KSR*, 127 S.Ct. at 1739, 82 USPQ2d at 1395 (citing *Graham*, 383 U.S. at 12, 148 USPQ at 464 (emphasis added)), and reaffirmed principles based on its precedent that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *Id.* The Court explained:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

*Id.* at 1740, 82 USPQ2d at 1396. The operative question in this “functional approach” is thus “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.*

The Supreme Court stated that there are “[t]hree cases decided after *Graham* [that] illustrate the application of this doctrine.” *Id.* at 1739, 82 USPQ2d at 1395. “In *United States v. Adams*, … [t]he Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.” *Id.* at 1739-40, 82 USPQ2d at 1395. “*Sakraida and*

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*Anderson's-Black Rock* are illustrative – a court must ask whether the improvement is more than the predictable use of prior art elements according to their established function.” *Id.* at 1740, 82 USPQ2d at 1395.

## ANALYSIS

We agree with the Examiner (Answer 3) that Pepperling discloses providing a pressure port having a material with a first hardness and providing a housing, with the pressure port having a mounting boss and the housing having a receptacle for receiving the mounting boss (Findings of Fact 1-3). We further agree with the Examiner (Answer 3) that Pepperling does not disclose providing a housing having a material having a second hardness less than the first hardness; configuring the mounting boss of the pressure port with knurls thereon, the knurls oriented parallel to an axis of the pressure port; or pressing the mounting boss of the pressure port into the receptacle of the housing along a direction of the axis such that the knurls deform the receptacle of the housing to conform about the knurls to define a semi-rigid mount (Finding of Fact 4). We also agree with the Examiner (Answer 3) that Ito discloses a jointing structure in which a rotor has a second hardness less than a first hardness of the shaft (Findings of Fact 5 & 6). We further agree with the Examiner (Answer 3-4) that Ito’s shaft is configured with knurls thereon oriented parallel to an axis of the shaft and that Ito discloses pressing the knurls into the rotor opening such that the knurls deform the rotor opening to confirm about the knurls to define a firm joint (Finding of Fact 7).

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The Examiner found, with regard to claim 1:

[I]t would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the housing of Pepperling with a second hardness less than the first hardness, to provide the mounting boss of the pressure port with straight knurls thereon such that the knurls are oriented parallel to an axis of the pressure port, to press the mounting boss of the pressure port into the receptacle of the housing along a direction of the axis such that the knurls deform the receptacle of the housing to conform about the knurls to define a semi-rigid mount, in light of the teachings of Ito, in order to firmly join the components together by press-fit, and to intimately mesh the inner and outer surfaces of the components thereby forming a firm jointing.

(Answer 4.)

The Appellants argue that there would have been no motivation to combine the teachings of Pepperling and Ito for three reasons. First, the Appellants argue that because Pepperling does not indicate any defects with its press-fit attachment, or allege any disadvantage of such an attachment, there would be no reason why one of ordinary skill in the art would have been motivated to modify it (Appeal Br. 10; Reply Br. 1). We find this argument unconvincing. It is not necessary for a determination of obviousness that the reference to be modified recognize or acknowledge a deficiency with its own design in order to provide a motivation to modify or improve it. As noted by the Court in *KSR*, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is

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obvious unless its actual application is beyond his or her skill.” 127 S.Ct. at 1740, 82 USPQ2d at 1396.

Second, the Appellants argue that the Examiner provides no evidence that those concerned with the problems facing pressure sensor designers, i.e., the problem of lateral forces, would consult rotor design references, which address torque forces (Appeal Br. 10; Reply Br. 2). We again find this argument unpersuasive.

The Appellants’ Specification notes that high pressure sensors are subject to internal forces from fluid pressure and external forces from installation and assembly of the sensor along with temperature changes during use (Specification 1:14-17). The Specification then notes a need exists for a sensor assembly that can withstand these internal and external stresses and “limits the potential for lateral movement damage” (Specification 2:13-16). The Specification further describes the attachment produced by its method as being “rigid against push-out and torque-out forces, but does not totally constrain the port allowing some lateral movement 22 if needed” (Specification 4:24 – 5:1). As such, one of the forces with which the Appellants’ invention is concerned is a torque force.

Ito teaches that its jointing structure produces a firm jointing by intimately meshing the rotor and the humps and valleys of the shaft through deformation of the through-hole of the rotor (Finding of Fact 7). This intimate meshing would provide resistance to all types of forces on the joint, including push-out forces, torque-out forces, and limiting the potential for lateral movement damage. As such, one having ordinary skill in the art would have recognized that the knurled

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press-fit arrangement of Ito would provide an improved joint between the pressure sensor and the housing and provide resistance to such forces.

One of ordinary skill in the art would have been able to replace the press-fit between the housing and pressure port of Pepperling with the knurled press-fit arrangement of Ito using methods known in the art at the time the invention was made. Moreover, each of the elements of Pepperling and Ito combined by the Examiner performs the same function when combined as it does in the prior art. Thus, such a combination would have yielded predictable results. *See Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 282, 189 USPQ 449, 453 (1976).

Third, the Appellants argue that the Pepperling sensor, as modified by the teachings of Ito, would not function as intended, because the Ito reference aims to produce a firmly-jointed structure, and the sensor assembly must be able to allow some lateral movement to prevent mounting stress sensor error (Appeal Br. 11; Reply Br. 3). The Appellants, however, have provided no evidence to support this contention. Pepperling describes that a press-fit attachment, in which the housing deforms when the sensor assembly is press-fit into the opening in the housing, is appropriate for use with its pressure sensor assembly (Finding of Fact 2). Further, Ito describes the joint structure achieved using its knurled press-fit arrangement as “firmly jointed” (Finding of Fact 5), but Ito does not describe that its joint structure prevents all lateral movement between the shaft and rotor. As such, without evidence to support the Appellants’ contention that using the known press-fit arrangement of Ito for Pepperling’s press-fit attachment would not allow

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Pepperling's device to operate for its intended purpose, we find the Appellants' argument unpersuasive.

Claim 1 is a combination which only unites old elements with no change in their respective functions and which yields predictable results. Thus, the claimed subject matter likely would have been obvious under *KSR*. In addition, neither Appellants' Specification nor Appellants' arguments present any evidence that the addition of a knurled press-fit arrangement to a pressure port is uniquely challenging or difficult for one of ordinary skill in the art. Moreover, the knurled press-fit of Ito is a technique that has been used to improve one device (the rotor and shaft jointing structure of Ito), and one of skill in the art would recognize that it would improve similar devices in the same manner.

Because Appellants have not shown that the application of the Ito knurled press-fit arrangement to form a jointing structure between the pressure port and housing of Pepperling would have been beyond the skill of one of skill in the art, we find using the technique would have been obvious. As such, the Examiner did not err in holding that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the pressure sensor assembly of Pepperling to add the knurled press-fit arrangement of Ito to provide a better press-fit connection and thereby obtain a firm jointing (Answer 4). Claims 2-12 were not argued separately, and fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2006).

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### CONCLUSIONS OF LAW

We conclude that the Appellants have failed to show that the Examiner erred in rejecting claims 1-12 under 35 U.S.C. § 103(a) as unpatentable over Pepperling and Ito.

### DECISION

The decision of the Examiner to reject claims 1-12 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

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